CT Colonography: State of the Art

by Wei Han Fang, MD, Clinical Assistant Professor, Body Imaging

Introduction

Colon cancer is the second leading cause of death in industrialized nations and it is estimated to cause ~55,000 deaths per year. Fortunately, colon cancer is preventable with early screening and identification of pre-cancerous polyps called adenomas (Fig. 1). In fact, over 95% of colon cancers are thought to arise from this adenoma-carcinoma sequence. The gold standard for catching and removing these premalignant lesions has been optical colonoscopy. Unfortunately, the success rate of people actually undergoing colorectal screening hovers at a meager 50%. However, in 1994 CT colonography (CTC or virtual colonoscopy) was introduced by Vining and colleagues with the first clinical use of CTC performed in 1996 on 10 patients by Hara et al. More recently in 2008, the American Cancer Society added CTC to its list of approved colorectal screening options. At the University of Iowa Hospitals and Clinics, CTC has been in place since 2005.

Technique

When patients undergo CTC examination, I routinely tell them that there are 3 essential components to a good CTC exam. The first is a clean colon, which much like optical colonoscopy, requires a cathartic bowel prep. However, unlike optical colonoscopy, part of the cathartic bowel prep requires the patient to drink barium and iodinated solutions to help “tag” the stool and residual fluid in the colon, which will help differentiate between a true polyp versus retained fecal material (Fig. 2). The second essential component is adequate distension, which is achieved with automated CO₂ insufflation via a rectal catheter, and similar to an abbreviated barium enema, we have the patient roll on their sides to try to evenly distribute the CO₂. Of note, during the insufflation, patients may experience cramping and gas pains, but this should be the worst thing they experience. Finally, the last essential component to a good CTC examination is no motion.
Patients are scanned at least twice; once on their back and the other on their belly to ensure adequate mucosal visualization, adequate distension, and increase detection of abnormalities by allowing the air and any residual fecal material to move dependently (Fig. 3). During CT acquisition, any amount of motion can degrade visualization and create artifacts. Therefore, it is imperative to have a good breath hold with a relatively short scan time. This is achieved by using multidetector CT. Experts and studies have shown that at minimum 4 detectors are needed. Our studies are routinely done on 16 detectors or greater.

Once the data is acquired, it is sent to a special three-dimensional workstation, where both three-dimensional and two-dimensional images can be created and correlated simultaneously. Much like mammography, a standardized reporting system called the CT Colonography Reporting and Data System (C-RADS) has been created. In a screening population and using a 6 mm polyp size threshold, the optical colonoscopy referral rate after CTC would be ~10%.

Safety

At least 3 areas of concern arise when considering CTC. The first is perforation risk. Overwhelmingly, studies have shown that CTC is safer than optical colonoscopy. Perforation rates for optical colonoscopy have been reported to range from 0.03-0.65%, whereas perforation rates with CTC have been reported up to 0.06%.\(^1\) The second area of concern is radiation exposure. CTC exams are performed as low dose (mAs) CT scans. As a comparison, our CTCs are performed with an effective mAs of 100, whereas our routine abdomen CT is at 250 effective mAs. The average radiation dose for a complete (i.e., supine and prone) CTC exam is calculated at 10.2 mSv, which is roughly the equivalent dose of performing a routine abdomen CT. Put differently, 10.2 mSv is roughly 4 years worth of background radiation assuming average background radiation is 2.4 mSv. Finally, there is the issue of incidentalomas, or in this case, extracolonic findings, which is not an issue unique to CTC, but is inherent with any imaging study. Obviously, some extracolonic findings may serve as a benefit to the patient such as serendipitous discovery of an occult carcinoma. However, false positives can cause undue distress and additional, though usually negligible, cost (average work-up cost of extracolonic findings = $24-34\(^2\)). The rate of clinically significant extracolonic findings, which may require additional work-up, would be ~10%.

Accuracy

There are 2 landmark studies to date comparing the accuracy of CTC to optical colonoscopy. Perhaps the best designed study was from Pickhardt et al. in 2003, where they used segmental unblinding and thus created a new enhanced gold standard of unblinded optical colonoscopy plus CTC. By creating this new enhanced gold standard, this allowed one to compare head to head, CTC versus blinded optical colonoscopy. Interestingly, Pickhardt achieved higher sensitivities for the detection of significant polyps compared with blinded optical colonoscopy alone and achieved 95.9% accuracy for detection of adenomatous polyps ≥10 mm.\(^3\) The other landmark study was the ACRIN study from Johnson et al in 2008, where they sought to prove that CTC could be performed with high accuracy in a community setting (i.e., more heterogeneity compared to the Pickhardt study). Unfortunately, in this study no segmental unblinding was used putting CTC at a disadvantage, but despite this they still achieved 89% accuracy for polyps ≥10 mm.\(^4\)

Indications and Contraindications

CTC is indicated if patients have had an incomplete optical colonoscopy, which is defined as failure to intubate the cecum, or if patients cannot undergo optical colonoscopy (i.e., bleeding risk, contraindication to sedation, etc). Similar to enema studies, CTC is contraindicated in patients with acute abdomen. However, there are a slew of other potential indications (including the use of CTC for screening asymptomatic average risk patients) and contraindications, which remain controversial and are beyond the scope of this article.

Summary

CTC is a safe, new technique that achieves at least similar if not better accuracy compared to optical colonoscopy. It can be used as an alternative screening modality to complement optical colonoscopy and hopefully increase colorectal screening rates with eventual reduction in morbidity and mortality from colon cancer.

References


Notes from the Chair

The warm and exceptionally beautiful days of last year’s Iowa summer were reason enough to be thankful. Mild temperatures and adequate rainfall ensured that flower gardens were abloom and vegetable gardens bountiful. But, here in Iowa, and particularly in the Department of Radiology, we had so much more to be thankful for. Although the national economic crisis continues, we had an exceptionally successful year fulfilling our clinical, research, and education missions. As a department, we have weathered the storm fairly well.

Last year, the department and the institution invested (and, I believe, wisely) in new information technology that provided us with a new radiology information system and a robust hospital information system. As we have learned from these initiatives, no system is perfect, but it is becoming clear that EMR has great potential to improve patient care delivery by better organizing vast amounts of medical information and by reducing errors and oversights.

On the research side, we responded in force to the funding made available under the government’s economic stimulus and recovery plan, submitting applications for funding, including supplements for ongoing programs and projects designed to increase the number and level of jobs in research. We have received news on some of those submissions and remain hopeful that awards arising from this program will fulfill the mission of generating worthwhile scientific advancement while stimulating economic recovery. Last year was also a successful year for recruiting and hiring. We are nearly fully staffed in our clinical areas and have made some key recruitments on the research side. We are fortunate to have welcomed talented new faculty in Chest Radiography, Interventional Radiography, Neuroradiology, Nuclear Medicine and the Division of Image and Research.

At last year’s RSNA, the Department had another strong presence. Over 35 lectures, plenary sessions, scientific or education exhibits, and scholarly abstracts were delivered by our faculty. We also enjoyed visiting with alumni, prior faculty and friends of the department at our annual reception held at the Chicago Downtown Marriott Hotel. As always, it was a pleasure to see current and former members get together to reminisce and network.

Lastly, I would like to once again express my appreciation for the incredible dedication and talent of our faculty, trainees, and staff, who make all of our successes possible. At the end of each fiscal year, I sometimes imagine that our department could not be more successful or productive in the subsequent year. However, it never fails that I am pleasantly surprised by the creativity of our department and faculty in fulfilling all of our missions, our continued forward progress and the commitment and talent of our staff.

Please remember that you may always contact me with your comments and suggestions, and I invite you to visit our website as a continuing source of new information about the Department of Radiology: http://www.healthcare.uiowa.edu/radiology.

I wish everyone the best for 2010!

Sectional Update

Interventional Radiology

by Shiliang Sun, MD, Clinical Associate Professor, Director of Interventional Radiology

As Dr. John Kaufman, President of SIR, stated: “Nowadays, it is getting harder to make a living. There is a lot of uncertainty and it is often frustrating. But IR continues to be interesting, challenging, rewarding and ever-enlarging in scope. There are few specialties that offer what we have in IR.”

The Interventional Radiology Section has experienced the

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growth of work loads and improve the quality of our services.

In the past few years, many new procedures and services have been pioneered at UIHC and have become a part of our routine clinical practice. For example, venous sampling for diagnosis of endocrine disorders has been developed and utilized in our daily practices, including hepatic venous sampling after transarterial calcium stimulation for localization of occult insulinoma, and adrenal vein sampling for lateralization of aldosteronomas. These diagnostic modalities have been helping our medical and surgical colleagues to effectively and precisely manage endocrine tumors.

In full collaboration with our oncology and surgical colleagues we have been able to develop and establish protocols for clinical services and research. These include thrombolytic therapy for DVT, as a site of a multiple center study in research collaborated with vascular surgery, trans-hepatic right portal venous embolization for facilitating surgical resection of a large portion of the liver with metastatic lesions collaborated with liver transplant surgery, radiofrequency ablation of renal masses in collaboration with Urology, and DC-beads chemoembolization for treatment of hepatic malignancies in collaboration with Medical Oncology, etc.

In collaboration with the Section of Nuclear Medicine and the Clinical Cancer Center, internal radiation therapies by trans-hepatic artery delivery of spheres containing Yttrium-90 have become a routine practice and can be safely conducted by all IR members who have been certified to perform such procedures for treatment of metastases to the liver. Combined with Yttrium sphere embolization, radio-frequency ablation, DC-beads embolization, lipiodol-based chemoembolization, and preoperative portal vein embolization, we have developed a spectrum of interventional oncology coverage for the treatment of late stage liver and kidney tumors. Furthermore, Interventional Radiology continues to be recognized as a unique clinical service to manage massive and life-threatening hemorrhages. Our outpatient clinic continues to work well. The multi-disciplinary fibroids clinic continues to be successful with more patients recruited and treated by uterine artery embolization.

In the past couple of years, IR has experienced significant staff shortages with the departures of Drs. Hicham Abada, Jafar Golzarian, and Ramin Midia. With only three staffs remaining (including Dr. Sandeep Laroia who joined us in the beginning of this academic year) we managed to cover two hospitals (VAMC and UIHC) with four operating rooms. Though we are part of an esteemed academic center, we have been practicing like a private practitioner with no academic time and limited opportunities to take our entitled vacation time. What has helped our staff to survive and thrive are our loyalty, positive work ethics, and our love of IR. Without the above, it would have been quite difficult to continue as successfully as we have.

We had the good fortune of having Dr. Laroia join us five months ago, who has brought with him impressive experience in internal medicine. His primary interests are in interventional radiology with special concentration on medical issues related to IR and establishing medical guidelines and protocols.

Recruitment of IR staff and a physician assistant is now in progress. We believe that we will be joined by fresh new talent in the near future and IR will continue to succeed and excel.

New Residents

**DIAGNOSTIC RADIOLOGY**

**Front row, left to right:**
Christine Jacobsen, MD, University of Iowa, Carver College of Medicine
Sarah German, MD, Creighton University
Janet Pollard, MD, University of Oklahoma
Catherine Metz, MD, University of Iowa, Carver College of Medicine

**Back row, left to right:**
David Zander, MD, University of Nebraska
Edwin Butler, MD, Baylor College of Medicine
Seth Anderson, DO, Des Moines University College of Osteopathic Medicine
Tariq Balawi, MD, University of Jordan
Harnoor Singh, MBBS, Government Medical College, Punjab, India
Welcome New Faculty!

Archana T. Laroia, MD, joined the Department of Radiology as a Clinical Assistant Professor. Dr. Laroia received her medical training from the Postgraduate Institute of Medical Education and Research in Chandigarh, India. After completing an internship at the University of North Dakota School of Medicine in Fargo, ND, she went on to do fellowship training at the University of Iowa Carver College of Medicine in Body Imaging, Chest and Cardiovascular Imaging and Breast Imaging. Dr. Laroia joins the faculty of the Chest and Cardiovascular Section.

Sandeep T. Laroia, MD, Clinical Assistant Professor, joined the Vascular Interventional Section of the Department of Radiology. He received his medical training at the Postgraduate Institute of Medical Education and Research, Chandigarh, India. He completed a year of residency training in Interventional Radiology there as well before serving as an attending radiologist at the NASA Scan Center in New Delhi. Later he completed residency training in Internal Medicine at the University of North Dakota School of Medicine and then moved into the ranks of Assistant Professor of Medicine. Prior to his appointment at University of Iowa Hospitals & Clinics, Dr. Laroia completed fellowships in both Vascular and Interventional Radiology and Neuroradiology in our department.

Kevin M. Schartz, PhD, MCS, Research Assistant Professor, joined the Perceptual Research section of the Department of Radiology. Dr. Schartz received his PhD in Experimental Psychology and later a MSC in Computer Science with Software Engineering specialization, both from The University of Iowa. Prior to his appointment in Radiology, Dr. Schartz served as an Assistant Professor in the Department of Psychology at Missouri State University in Springfield, MO. He also held Research Scientist positions, as well as Application Development & Support positions in the Law Health Policy & Disability Center and the Department of Radiology at The University of Iowa. Dr. Schartz’s current research interests include developing software tools to conduct observer performance and technology evaluation studies in diagnostic radiology.

Michael K. Schultz, PhD, joined the Department of Radiology as an Assistant Professor. Dr. Schultz received his PhD in Chemical Oceanography from Florida State University. Prior to his appointment in Radiology, Dr. Schultz served as an Associate in the Departments of Internal Medicine and Radiation Oncology at University of Iowa Hospitals & Clinics. Dr. Schultz also worked as a Physical Scientist at the National Institute of Standards and Technology in Gaithersburg, MD, where he was a researcher in the Nuclear Medicine Standards Program and FDA Liaison for radiopharmaceutical standards and traceability. His current research interests include developing synthetic-bioactive molecular targeting vectors for multimodality imaging and therapy of cancer and cardiovascular disease. Dr. Schultz joins the section of Nuclear Medicine / PET.

In addition to our new faculty, we also welcomed the following 2009-2010 fellows:

**Body Imaging**
- Shirley Bell, MD, Fellow
- Amol Katkar, MD, Fellow
- Achint Singh, MD, Fellow

**Musculoskeletal**
- Philip Budihardjo, DO, Fellow-Associate
- Jonathan Hart, MD, Fellow-Associate
- Kathleen O’Mara, MD, Fellow-Associate
- Robert Palmer, MD, Fellow-Associate

**Interventional Neuroradiology**
- Wei Liu, MD, Fellow-Associate

**Neuroradiology**
- Ahmad Izard, MD, Fellow
- Kevin Llewellyn, MD, Fellow
- Nita Parekh, MD, Fellow
- Matthew Peterson, MD, Fellow

**Pediatric**
- Lokesh Khanna, MD, Fellow

**Breast Imaging**
- Limin Yang, MD, Fellow-Associate

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**Winter 2010**
Honors & Awards

D. Lee Bennett, MD, MA
- Chair of the Nominating Committee for the Society of Skeletal Radiology, 2009-present
- Moderator, Upper extremity and US session of the Annual Meeting of the Society of Skeletal Radiology, Charleston, SC, March 8-11, 2009

Michael P. D’Alessandro, MD
- Recipient of the 2008 Blue Skies Award from the Royal College of Radiologists and presenter of lecture entitled, “RCollaboration: A Radiology Learning Community Built Around Content, Conversations and Connections”

M. Cristian Dobre, MD
- Accepted for the Introduction to Academic Radiology (ITAR) program at the 2010 American Roentgen Ray Society conference

Georges Y. El-Khoury, MD
- Recipient of the 2009 Gold Medal Award from the Iowa Radiological Society, Iowa City, IA
- Examiner for the American Board of Radiology
- Recipient of the 2008 Faculty Service Award from the UI College of Medicine, Iowa City, IA
- The 2009 issue of The Iowa Orthopaedic Journal was dedicated to Dr. El-Khoury for his 33 years of devotion to education, his mentorship activities and expertise in orthopedic imaging by the UI Orthopedic Department

Laurie L. Fajardo, MD, MBA
- Elected to serve on the American College of Radiology’s College Nominating Committee and subsequently elected to serve as the Co-Chair of the committee
- Managing Editor for a new column in JACR Journal of the American College of Radiology in its annual “Most Influential in Radiology” issue

Michael M. Graham, MD, PhD
- President, Society of Nuclear Medicine, 2009-present
- Editorial Board, Journal of Nuclear Medicine
- Consulting Editor, Journal of Nuclear Medicine Technology
- Recognized by RT Image in its annual “Most Influential in Radiology” issue for 2009 as a “Most Notables and Ones to Watch”

Ameera F Ismail, MD
- Awarded 1st Place for the 2010 Scientific Trainee Prize from the Association of University Radiologists for her extended abstract entitled, “Wind-swept appearance: a new sign to describe subscapularis tendon tears”

Awards Received at National Meetings


Park JM, MD, Yang L, Laroia AT, Fajardo LL. Axillary lesions: are those really lymph nodes? Radiological Society of North America 95th Annual Meeting, Chicago, IL December 2009. CERTIFICATE OF MERIT

Smoker WRK, Baima J, Gentry L, Michel M, Reed D. Don’t talk with your mouth full: causes of macroglossia. Radiological Society of North America 95th Annual Meeting, Chicago, IL December 2009. CERTIFICATE OF MERIT


Malik E. Juweid, MD
- Section Editor, Cancer Imaging in The Oncologist

Simon C.S. Kao, MBBS
- Editorial Board, Radiology Section of the online journal, Case Reports in Medicine

Mark T. Madsen, PhD
- Editorial Board, International Journal of Molecular Imaging

Geoffrey McLennan, MBBS, PhD
- National Academic Chair of the NIH supported multicenter studies in lung cancer imaging – the LIDC, IDRI and RIDER projects

"Best Doctors in America" has recognized the following members of the Radiology Department in its 2009-10 national database:

Monzer Abu Yousef, MD • Thomas Barloon, MD
Georges El-Khoury, MD • Laurie Fajardo, MD
Minako Hayakawa, MD • David Kuehn, MD
Alan Stolpen, MD • Yutaka Sato, MD • David Bushnell, MD
Michael Graham, MD • Daniel Kahn, MD • Yusuf Menda, MD

Winter 2010 Radiology Update
2008-2009 DEPARTMENTAL AWARDS

MEDICAL STUDENT TEACHING AWARDS

Gillies Award for Outstanding Senior Medical Student
Shawn Sato, MD

Outstanding Senior Faculty Teacher of the Year
Yusuf Menda, MD

Resident Teacher of the Year
Paul Wheeler, MD

Outstanding Junior Faculty Teacher of the Year
Eve Clark, MD

Resident Educator of the Year
Randy Anderson, MD

FACULTY AWARDS

Outstanding Departmental Service Awards
Tom Barloon, MD; D. Lee Bennett, MD; Brian Mullan, MD

Krabbenhoft Award for Excellence in Teaching
Alan Stolpen, MD

RESIDENT AWARDS

Resident Research Awards
Andrew Wu, MD: “Endovascular Surgery as Sole Therapeutic Modality for Intracranial Spinal Dural Arteriovenous Fistulas”
Ahmad Izard, MD: “Effectiveness of Endovascular Stent Treatment for Patients with Chronic Mesenteric Ischemia”

Resident Teacher of the Year
Ahmad Izard, MD

Chief Resident Recognition
Janet Dubois, MD; Paul Wheeler, MD

Resident Award for Outstanding Clinical Service
Nita Parekh, MD

Faculty Teachers of the Year
*Jung Hoon Kim, MD; Alan Stolpen, MD

Toshio Moritani, MD
• Listed in Who’s Who in Medicine and Healthcare for 2009-2010

Brian F. Mullan, MD
• Promoted to Clinical Professor
• Named William and Sondra Myers Family Professor of the College of Medicine, an endowed professorship for exemplary skill and passion for teaching of medical students and leadership in understanding and developing new methods of medical education

Janet Roe
• Voted “Most Effective Radiology Administrator/Manager” by AuntMinnie.com

Wendy R.K. Smoker, MS, MD
• Examiner, American Board of Radiology – Diagnostic Radiology Oral Board Examination, Louisville, KY, June 2009
• Selected for inclusion in 2010 edition of Who’s Who in America

Edwin J.R. van Beek, MD, PhD
• Selected for inclusion in 2009 edition of Who’s Who in Medicine and Healthcare
• Selected for inclusion in 2010 edition of Who’s Who in America

*Editors Note: The printed version of Radiology Update contained an incorrect photo for Dr. Jung Hoon Kim. The correct photo is listed on this page of the online version. We regret any confusion this may have caused.
The 2009 Jason Martin, MD, Medical Student Research Award in Image-Based Research

Two medical students were awarded The Jason Martin, MD, Medical Student Research Award in Image-Based Research during the awards banquet held at the conclusion of the 2009 Medical Student Research Day on Sept. 11, 2009. This year’s recipients were:

Randall Grout, M2, for his research project entitled, “Exploring the relationship between Total Pulmonary Vascular Volume and COPD-Related Measurements using Multi-Detector CT” (mentor: Eric Hoffman, PhD)

Ahmed Akhter, M2, for his project, “Mammillated Caudate Lobe and Venous Compression are Helpful as Ultrasound Markers in Diagnosing Liver Cirrhosis” (mentor: Monzer Abu-Yousef, MD)

The awards are named for Jason Martin, MD, a former medical student of the UI College of Medicine, and later Body Imaging fellow in the Department of Radiology, who passed away in 2008. His parents, James and Linda Martin, attended the awards ceremony.

Photos From the 2009 RSNA Alumni Reception

[Images of people at the reception]

From left to right: Laurie Fajardo, MD, Eric Hoffman, PhD, Randall Grout, Linda Martin, James Martin, MD, Ahmed Akhter, Monzer Abu-Yousef, MD

Photos courtesy of Nancy Harney
Cassandra Foens, MD, FACR, alumnus of the Department of Radiology and now a practicing radiation oncologist at Covenant Cancer Treatment Center in Waterloo, IA, says it was during her time working as an x-ray technologist for a radiation oncologist in Burlington, IA, that she realized she wanted to be a physician. She wanted to be the one seeing the patients and making decisions about their cancer treatments. So she returned to school to complete her pre-med studies at The University of Iowa and in 1983 was accepted into medical school at The University of Iowa College of Medicine.

It was during her medical student training that she first encountered David Hussey, MD, newly appointed chair of the Radiation Oncology Division that was then still a part of the Radiology Department. He had come to give a presentation to the medical students, and she was so excited about the presentation that she approached Dr. Hussey after the lecture and declared, “I’ll be looking for a residency program in about a year and a half, and I hope you’ll reserve a spot for me!” She went on to tell him about her background and interest in radiation oncology. Sure enough, when the time came to apply, he remembered her and she was admitted to the residency program, following an internship year at the University of Illinois College of Medicine at Peoria.

It was 1988, Dr. Tony Franken was chair of the Radiology Department, and Dr. Hussey still chaired the Radiation Oncology Division. Dr. Foens loved her residency experience at Iowa. She has fond memories of working with Drs. William Stanford, Yutaka Sato and Wilbur Smith, who were faculty at the time. But it was Dr. Hussey who really nurtured her growing interest in political medicine. At that time, the American College of Radiology (ACR) did not have any formal programs for residents and fellows, so it was unusual for them to attend meetings. Dr. Hussey, however, allowed her time off to attend meetings and gave her opportunities to explore her interests in the socio-economic aspects of medicine. “He took a chance on a small-town girl,” she said.

As a resident, Dr. Foens served on the board of the Association of Residents in Radiation Oncology (ARRO). When the board needed to appoint a representative to attend ACR meetings, she was selected to go. Dr. Foens recalled the feeling of sitting in meetings with the very people who’d authored the texts she was reading, and how exciting it was to have these people express sincere interest in what she had to say. She became fascinated with the process of policy making. Later she was selected to represent Iowa on the Council of Affiliated Regional Radiation Oncology Societies (CARROS). Since then she’s been very active with the ACR, serving on numerous councils and committees. Most recently she was elected to serve on the Board of Chancellors, the governing body of the ACR, and holds the distinction of being both the first woman and the first radiation oncologist (and only the third Iowan) to hold that position. She has traveled to Washington, DC, to work with Bruce Braley and other congresspeople on issues regarding imaging in rural areas of Iowa, and has been very active in advocating for patients and women on both local and national levels.

In her free time, Dr. Foens is a certified scuba diver and has traveled to Florida, the Cayman Islands and Cozumel. Her scuba buddy is her 76-year-old dad. She loves to bake and decorate cakes, hang out with her three cats—Muffin, Shy and Honey—and is a devoted auntie to her nieces and nephews.
Publications

Books/Book Chapters


Articles


Graham MM. The PET/CT report: the most important part of the study. J Nucl Med. 2010 Jan;51(1):5-6.


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Publications, continued from previous page


Scientific Presentations


Invited Speakers

- El-Khoury GY. 1) Imaging of musculoskeletal infections; 2) Interesting case conference for residents; 3) Imaging of acute and chronic muscle injuries in athletes; 4) MDCT in imaging of cervical spine injuries. Saint Luke’s Hospital, Kansas City, MO, February 26-27, 2009. [Visiting Professor]
- El-Khoury GY. Imaging of common arthritic diseases. Broadlawns Medical Center, Des Moines, IA, October 29, 2009. [Visiting Professor]
- Maley JE. The Balancing Act: Caring for your career and yourself. Small Group Facilitator. Women Faculty Career Development Conference. The University of Iowa College of Medicine, Coralville, IA, February 27, 2009.
- Moritani T. MR imaging of secondary degeneration and white matter anatomy. Department of Radiology, Showa University, School of Medicine, August 21, 2009.

Invited / Refresher Course Faculty


Hichwa R. Radiology research: deductions from the literature and how they may be applied to your research. Radiological Society of North America 95th Annual Meeting, Chicago, IL, Nov-Dec 2009.


Ponto LLB. A look at PET: past, present and its prospect for the future: “Two steps forward, one step back…” Correspondence Continuing Education Courses for Nuclear Pharmacists and Nuclear Medicine Professionals, University of New Mexico. 2009;15(1).


Smoker WRK. 1) Spinal neoplasms; 2) Degenerative spine disease and spinal infections; 3) Vascular and miscellaneous spinal pathology; 4) Suprahyoid neck I (SS, PPS, CS); 5) Suprahyoid neck II (MS and PS); 6) Suprahyoid neck III (PMS and oral cavity). Armed Forces Institute of Pathology, Bethesda, MD, April 2009.


Exhibits / Posters


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Exhibits / Posters, continued from previous page


New Grants

PI: Laurie L. Fajardo, MD, MBA
Title: A Comparison of 15 Degree and 30 Degree Acquisition Angle Breast Tomosynthesis Mammography in the Visualization and Characterization of Breast Abnormalities
Sponsor: Hologic, Inc.
Amount: $75,000
Duration: 9/18/2009 - 9/18/2010

PI: Eric A. Hoffman, PhD
Title: ARRA: MESA-ASAP
Sponsor: Columbia University
Amount: $100,908
Duration: 9/1/2009 - 8/31/2010

PI: Jun Ni, PhD
Title: NSF-CCF-EMT Workshop on Cyberinfrastructure (CI)-based Emerging Models and Petascale Computing for Nanoscience and Nanotechnology
Sponsor: US National Science Foundation
Amount: $50,000
Duration: 9/15/2009 - 8/31/2010

PI: John J. Sunderland, PhD
Title: Generation of a [Rb-83]-Based PET Cardiac Perfusion Database in a Cardiovascularly Normal Patient Population
Sponsor: Siemens Medical Solutions USA, Inc.
Amount: $197,240
Duration: 1/22/2010 - 9/30/2010

PI: John J. Sunderland, PhD
Title: Characterization of [Rb-82]-Based PET Cardiac Perfusion Software in a Patient Population
Sponsor: Siemens Medical Solutions USA, Inc.
Amount: $40,204
Duration: 1/22/2010 - 9/30/2010

PI: John J. Sunderland, PhD
Title: Comparison of Validated Quantitative [N-13]Ammonia PET Cardiac Perfusion with [Rb-82] Based Measurements in a Cardiovascularly Normal Patient Population
Sponsor: Siemens Medical Solutions USA, Inc.
Amount: $102,034
Duration: 1/22/2010 - 9/30/2010